

WHAT IS CLAIMED IS:

1. A subscriber loop interface circuit comprising:
an AC current source configured to synthesize a desired impedance termination and further to implement high fidelity speech transmit and receiving functions; and
a constant DC current source in parallel with the AC current source and configured to have an efficiency of at least 80% and further to present a high impedance to voice band signals.
2. The subscriber loop interface circuit according to claim 1 wherein the DC current source comprises a switched-mode current boost converter.
3. The subscriber loop interface circuit according to claim 2 wherein the switched-mode current boost converter comprises a first semiconductor switch and a second semiconductor switch, wherein the first and second semiconductor switches are configured such that when the first semiconductor switch is open, the second semiconductor switch is closed to implement a first state, and further such that when the first semiconductor switch is closed, the second semiconductor switch is open to implement a second state.
4. The subscriber loop interface circuit according to claim 3 wherein the switched-mode current boost converter further comprises a capacitor configured to be charged by a current source when the first and second semiconductor switches are in the first state, and further configured to be discharging when the first and second semiconductor switches are in the second state.
5. The subscriber loop interface circuit according to claim 4 wherein the switched-mode current boost converter further comprises a series inductor at its output, wherein the inductor is operational to achieve the high impedance in a subscriber line voice band, and further wherein the inductor has an inductance that is sufficient to limit converter output current ripple to less than about one percent.

6. The subscriber loop interface circuit according to claim 5 wherein the first semiconductor switch comprises a CMOS transistor that is operational in response to a dynamically time varied input signal to cause the switched-mode current boost converter to switch between its first and second states to maintain a constant output current.

7. The subscriber loop interface circuit according to claim 6 wherein the second semiconductor switch comprises a fast response diode that is operational to switch alternately and in complimentary fashion with the CMOS transistor in response to the dynamically time varied input signal.

8. The subscriber loop interface circuit according to claim 1 wherein the DC current source comprises a switched-mode voltage-to-current trans-converter.

9. The subscriber loop interface circuit according to claim 8 wherein the switched-mode voltage-to-current trans-converter comprises a first semiconductor switch and a second semiconductor switch, wherein the first and second semiconductor switches are configured such that when the first semiconductor switch is open, the second semiconductor switch is closed to implement a first state, and further such that when the first semiconductor switch is closed, the second semiconductor switch is open to implement a second state.

10. The subscriber loop interface circuit according to claim 9 wherein the switched-mode voltage-to-current trans-converter further comprises a series inductor at its output, wherein the inductor is operational to achieve the high impedance in a subscriber line voice band, and further wherein the inductor has an inductance that is sufficient to limit trans-converter output current ripple to no more than about one percent.

11. The subscriber loop interface circuit according to claim 10 wherein the first semiconductor switch comprises a CMOS transistor that is operational in response to a dynamically time varied input signal to cause the switched-mode voltage-to-current trans-converter to switch between its first and second states to maintain a constant output current.

12. The subscriber loop interface circuit according to claim 11 wherein the second semiconductor switch comprises a fast response diode that is operational to switch alternately and in complimentary fashion with the CMOS transistor in response to the dynamically time varied input signal.

13. A subscriber loop interface circuit comprising:
a switched-mode current boost converter configured to provide a constant DC current feed to a subscriber line, wherein the current boost converter includes:
at least one capacitor;
at least one output series inductor;
a first switch; and
a second switch, wherein the first and second switches are responsive to a dynamically time varied input signal to switch alternately and in complementary fashion to implement a first state and a second state such that the at least one capacitor is caused to be charged by a current source while in the first state and to be discharging via the at least one output series inductor while in the second state to generate the constant DC current feed.

14. The subscriber loop interface circuit according to claim 13 further comprising an AC current source configured to synthesize a subscriber line termination impedance and to implement subscriber line high fidelity speech transmit and receiving functions.

15. The subscriber loop interface circuit according to claim 13 wherein the first switch comprises a CMOS transistor that is operational in response to the dynamically time varied input signal to cause the switched-mode current boost converter to switch between its first and second states to maintain a constant DC output current.

16. The subscriber loop interface circuit according to claim 15 wherein the second switch comprises a fast response diode that is operational to switch alternately and in complimentary fashion with the CMOS transistor in response to the dynamically time varied input signal.

17. The subscriber loop interface circuit according to claim 13 wherein the dynamically time varied input signal is generated via a pulse width modulated controller.

18. A subscriber loop interface circuit comprising:

a switched-mode voltage-to-current trans-converter configured to provide a constant DC current feed to a subscriber line, wherein the voltage-to-current trans-converter includes:

at least one output series inductor;

a first switch; and

a second switch, wherein the first and second switches are responsive to a dynamically time varied input signal to switch alternately and in complementary fashion to implement a first state and a second state such that the at least one output series inductor is caused to be charged by a voltage source while in the first state and to be discharging via the subscriber line while in the second state to generate the constant DC current feed.

19. The subscriber loop interface circuit according to claim 18 further comprising an AC current source configured to synthesize a subscriber line termination impedance and to implement subscriber line high fidelity speech transmit and receiving functions.

20. The subscriber loop interface circuit according to claim 18 wherein the first switch comprises a CMOS transistor that is operational in response to the dynamically time varied input signal to cause the switched-mode voltage-to-current trans-converter to switch between its first and second states to maintain a constant DC output current.

21. The subscriber loop interface circuit according to claim 20 wherein the second switch comprises a fast response diode that is operational to switch alternately and in complimentary fashion with the CMOS transistor in response to the dynamically time varied input signal.

22. The subscriber loop interface circuit according to claim 18 wherein the dynamically time varied input signal is generated via a pulse width modulated controller.

23. A method of generating a subscriber line constant DC current feed comprising the steps of:

(a) providing a switched-mode current boost converter having a charging/discharging capacitor and further having a series output inductor coupled to the subscriber line;

(b) charging the capacitor via a current source for a first time period in response to a dynamically time variable input signal; and

(c) discharging the capacitor via the series output inductor for a second time period in response to the dynamically time variable input signal such that there is neither a net increase nor a net decrease of energy in the inductor and the capacitor, and further to generate a constant DC output current to the subscriber line, wherein the DC output current has a magnitude that is greater than the source current that is operative to charge the capacitor.

FOOTNOTES

24. A method of generating a subscriber line constant DC current feed comprising the steps of:

(a) providing a switched-mode voltage-to-current trans-converter having a series output inductor coupled to the subscriber line;

(b) charging the inductor via a voltage source for a first time period in response to a dynamically time variable input signal; and

(c) discharging the inductor via the subscriber line for a second time period in response to the dynamically time variable input signal such that there is neither a net increase nor a net decrease of energy in the inductor, and further to generate a constant DC output current to the subscriber line such that the DC output current has a magnitude that remains constant with changing subscriber line impedance.

25. A subscriber loop interface circuit comprising:

means for synthesizing a subscriber line termination impedance and further for implementing high fidelity speech transmit and receiving functions; and

means for generating a subscriber line constant DC current and for presenting a high impedance to subscriber line voice band signals, wherein the generating means has an efficiency of at least 80%.